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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/626,828	07/25/2003	Masahiro Fujii	1089.0490000/ALF	8717

26111 7590 09/18/2007
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EXAMINER

HYUN, PAUL SANG HWA

ART UNIT	PAPER NUMBER
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1743

MAIL DATE	DELIVERY MODE
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09/18/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

DETAILED ACTION**REMARKS**

This is a supplemental Office action intended to cure the deficiency of the Office action mailed June 21, 2007. In the Office action mailed June 21, 2007, an incorrect patent (Fujii et al. US 5,563,634) was identified in the art rejections. Consequently, the disclosure cited in the rejections did not correspond to the disclosure of the patent number identified in the rejections. This Office action hereby replaces the citation to Fujii et al. (US 5,563,634) with Fujii et al. (US 5,668,579).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims **1, 2, 8-10, 20-22, 25 and 26** are rejected under 35 U.S.C. 103(a) as being unpatentable over Fujii et al. (US 5,668,579) in view of Hayes et al. (US 4,877,745) and Purcell et al. (US 6,347,857 B1).

Fujii et al. disclose a piezoelectric ink jet head drive apparatus comprising an electrode substrate 2 having a plurality of electrodes 21 formed in correspondence with a plurality of pressurized chambers 6 bounded by a diaphragm 5 and a chamber substrate 1 that faces the electrode substrate 2. The apparatus also comprises a drive circuit 102 for applying a voltage between the diaphragm and the electrodes in order to

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discharge ink from the nozzle 4 of the ink jet head (see Fig. 2). Furthermore, the apparatus comprises a circuit that detects the drive voltage (and indirectly the drive current) applied to the piezoelectric element (see Fig. 23 and lines 22-30, col. 21). The detection circuit compares the detected drive voltage with a predetermined value to detect any abnormal fluctuation in drive voltages, which leads to faulty discharges (see lines 40-55, col. 6). The reference discloses that faulty discharges are caused by numerous factors, including bubble intrusion into the pressurized chambers (see lines 55-60, col. 3).

The apparatus disclosed by Fujii et al. differs from the claimed invention in that the reference does not disclose a control means for replacing the defective nozzle with a functional nozzle. The reference also does not disclose that the apparatus discharges biological samples.

In regards to the discharging of biological solutions, it is well-known in the art to dispense biological samples (i.e. protein and nucleic acid) using a jet head apparatus to form microarrays. Hayes et al. disclose a piezoelectric dispenser comprising a plurality of jetting heads 400 adapted to dispense biological solutions to form a microarray (see claim 4). In light of the teachings of Hayes et al., it would have been obvious to one of ordinary skill in the art to use the apparatus disclosed by Fujii et al. to dispense biological solutions to form microarrays.

In regards to the control means, Purcell et al. disclose a piezoelectric dispensing device comprising a plurality of jet heads, a discrimination means for discriminating the existence of a defective jet head, and a control means for performing a discharge using

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a functional jet head in place of the defective jet head (see lines 54-62, col. 2). In light of the teachings of Purcell et al., it would have been obvious to one of ordinary skill in the art to provide the Fujii et al. apparatus with a control means that delegates the duties of a defective nozzle to a fully functional nozzle so that the dispensing is not impaired by a malfunctioning jet head.

Claims **5 and 6** are rejected under 35 U.S.C. 103(a) as being unpatentable over Fujii et al. in view of Hayes et al. and Purcell et al. as applied to claims 1, 2, 8-10, 20-22, 25 and 26, and further in view of Ward et al. (US 6,640,621 B2).

Neither Fujii et al., Hayes et al. nor Purcell et al. disclose a discrimination means that detects the existence of a defective discharge based on a differential waveform of the drive current.

Ward et al. disclose a sensor that analyzes differential waveforms of signals to identify defective signals. The reference discloses that the derivative of a waveform can indicate significant deviations from a normal signal (see lines 58-60, col. 1 and lines 7-9, col. 35).

In light of the teachings of Ward et al., it would have been obvious to one of ordinary skill in the art to provide a means that differentiates the waveforms produced by the ejections of the modified Fujii et al. apparatus in order to easily identify the abnormal waveforms produced by a defective nozzle.

In regards to claim 6, it appears that any differential waveform that deviates from a normal differential waveform can be considered an indication of a defective nozzle.

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Although the references do not disclose a discrimination means that indicates the existence of a defective discharge based on a peak waveform appearing on the positive side two consecutive times, it would have been obvious to one of ordinary skill in the art to provide a discrimination means that indicates a defective nozzle when it detects a differential waveform signal that deviates from the normal differential waveform signal, including a differential waveform signal comprising consecutive positive peak values.

Claims **18 and 19** are rejected under 35 U.S.C. 103(a) as being unpatentable over Fujii et al. in view of Hayes et al. and Purcell et al. as applied to claims 1, 2, 8-10, 20-22, 25 and 26, and further in view of Terasawa (US 4,631,554).

Neither Fujii et al, Hayes et al. nor Purcell et al. disclose a recovery means comprising a suction that removes the solution to be dispensed from the nozzle.

Terasawa discloses an ink jet printing apparatus comprising a suction recovery unit (see lines 20-65, col. 2). The recovery unit comprises a suction pump 7 adapted to draw bubbles, excess ink and excess air from the nozzle of the apparatus in order to recover the defective nozzles to a functional state.

In light of the teachings of Terasawa, it would have been obvious to one of ordinary skill in the art to provide a suction to the modified Fujii et al. apparatus so that excess fluid and bubbles can be removed from the defective nozzles of the apparatus.

Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fujii et al. in view of Hayes et al. and Purcell et al. as applied to claims 1, 2, 8-10, 20-22, 25 and 26, and further in view of Wagner et al. (US 6,329,209 B1).

Neither Fujii et al., Hayes et al. nor Purcell et al. disclose dispensing protein solutions on a substrate to form a protein chip.

Wagner et al. disclose a method of forming protein chips using ink-jet printer heads (see lines 10-35, col. 23).

In light of the teachings of Wagner et al., it would have been obvious to one of ordinary skill in the art to form protein chips useful for assays using the modified Fujii et al. device.

Response to Arguments

Applicants' arguments with respect to the claims have been fully considered but they are not persuasive. Specifically, Applicants' argument that the Fujii et al. reference does not disclose a means for detecting the drive current is not persuasive. Although Fujii et al. do not explicitly disclose a means for detecting the drive current flowing between the diaphragm and the electrodes, the reference does disclose a means for detecting the drive voltage flowing between the diaphragm and the electrodes. Due to the direct relationship between voltage and current, one of ordinary skill in the art would recognize that the detecting means disclosed by Fujii et al. is indirectly detecting the drive current.


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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Paul S. Hyun whose telephone number is (571)-272-8559. The examiner can normally be reached on Monday-Friday 8AM-4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill Warden can be reached on (571)-272-1267. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

PSH
9/5/07


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